



Case Studies from the Child Development Center

Prematurity, multiple births and developmental disabilities: be cautious in attributing etiologies

Mark Simms, MD, medical director, Child Development Center, Children's Hospital of Wisconsin; professor, Pediatrics, Medical College of Wisconsin.

Identification of a specific etiology for developmental disabilities is one goal of a comprehensive developmental pediatric evaluation. This is particularly difficult in the situation of a prematurely born child who may have a variety of complications in the pre-, peri- and post-natal period. The following descriptions of premature, multiple birth sets illustrate some of the complexities in determining etiologic diagnoses.

Triplet boys

MB and GB, 3-year-old identical twin boys, were referred to the Child Development Center for evaluation of generalized developmental delay. They were part of a triplet set born at 29 weeks gestation after a relatively uncomplicated pregnancy. The third boy was non-identical. This was the mother's first pregnancy, and she did not smoke or use alcohol or illicit drugs. She had some first trimester bleeding for a few days that resolved spontaneously.

At 24 weeks, she experienced premature onset of labor and was placed on bed rest and given a course of tocolytic medication. Spontaneous rupture of membranes occurred on the day of delivery, and the triplets were delivered by cesarean section. The identical twins, MB and GB, were delivered first, and had birth weights of 1,360 and 1,275 grams respectively. Zygosity was determined shortly after birth. The non-identical triplet, TC, weighed 1,475 grams.

The neonatal course for the three children was relatively uncomplicated. None of them required ventilator support, developed seizures, central nervous system bleeding, systemic infection or retinopathy. Both MB and GB had difficulty nursing and required nasogastric tube feedings. They were discharged at 5 weeks of age on medication for reflux symptoms. Poor weight gain continued for both boys over the first three years of life, accompanied by slow development despite involvement in birth-to-three services. They were treated by health care professionals in the Wal-Mart/Sam's Club Feeding, Swallowing and Nutrition Center at Children's Hospital of Wisconsin for failure-to-thrive and were referred to the Child Development Center for evaluation of developmental delays. In contrast, the non-identical sibling, TC, grew normally and met all developmental milestones at the appropriate ages.

At age 3, MB's non-verbal cognitive skills were at an 11-month level, language skills were at a 6-9 month level and physical growth was at or below the third percentile for height, weight and head circumference. No dysmorphic features were noted and neurological examination revealed normal tone and reflex patterns. MRI of the brain was within normal limits. GB's non-verbal cognitive and language skills were at a 12-month level, and physical growth also was at or below the third percentile for height, weight and head circumference. Neurological examination was normal and MRI of the brain did not reveal any abnormalities. Previous examinations for genetic and metabolic abnormalities were normal, including chromosome karyotype, fragile X test, subtelomeric probes, FISH for velocardiofacial syndrome, serum aminoacids, urine organic acids, acylcarnitine profile, very long chain fatty acids, liver function, thyroid function, chemistry profile and carbohydrate deficient glycoprotein.

Twin girls

AW and SW were referred for developmental evaluation at age 15 to assess school-related problems. They were born to a primigravida mother who smoked five cigarettes per day. The pregnancy was uncomplicated until the mother ruptured her membranes spontaneously at 30 weeks gestation and delivered the twins vaginally.

AW was born first and weighed 1,100 grams. Her Apgar scores were three and five. SW weighed 1,300 grams and had Apgar scores of two, four and six. Both girls developed respiratory distress syndrome and required ventilatory support for 21 and 24 days respectively. In addition, AW developed grade III intraventricular hemorrhage and obstructive hydrocephalus. A ventriculoperitoneal shunt was placed at 5 weeks of age. She was discharged after 65 days in the nursery. SW's nursery course was complicated by delayed closure of the patent ductus arteriosus, requiring two courses of Indocin®. She had no seizures, CNS bleed or systemic infection and was discharged at 62 days. Although they shared a common (fused) placenta and were similar in appearance, the parents did not pursue genetic testing to determine whether they were identical or fraternal twins.

Inside this issue:

*Prematurity,
multiple births
and developmental
disabilities:
be cautious in
attributing
etiologies*

Prematurity, multiple births and developmental disabilities, *continued*

Over the first year of life, AW developed normally, although she was noted to have increased tone in both lower extremities. A VP shunt revision was performed at 4 years of age. Early academic skills developed normally. However, as she progressed through middle school, she experienced increasing difficulty with math. At 15 years old, her intellectual abilities were within the average range, but there was evidence of higher-level language processing delays. She frequently “talked around” topics, paused as if she was searching for the correct word, and worked slowly and deliberately on written assignments.

Beginning at 6 months of age, SW had symptoms of increased muscle tone and spastic deep tendon reflexes. General development progressed at a slow pace. She developed heel cord contractures and hip dislocations. At 15 years old, SW was unable to walk independently. Physical examination revealed mixed spastic quadriplegia, with superimposed left-sided hemiplegia. She was able to use a motorized wheelchair but required total assistance for activities of daily living. Intellectual abilities were in the moderate range of mental retardation and speech articulation was impaired by significant dysarthria.

Recent advances in perinatal care have resulted in increased survival and better overall outcomes for prematurely born children. However, among those born at or around 30 weeks gestational age, a significant number grow up with physical and developmental disabilities. For example, one follow-up study of infants born at or before 29 weeks gestation in the mid-1990s found that 15 percent had cerebral palsy, 20 percent had at least one severe physical disability, 20 percent had an IQ below 70 and 32 percent required special education services.

Summary

The cases described here suggest that clinicians should be cautious in attributing developmental disabilities in premature infants to “non-specific” etiologic factors. As in term infants, one should attempt to identify specific causal factors for disabilities in the prematurely born. For example, with respect to the triplet brothers, the history suggested that all three experienced similar “extrinsic” prenatal factors and none had suffered postnatal complications that would account for the problems seen in MB and GB. Thus, the most likely explanation for the developmental and growth problems is an unidentified “intrinsic” (genetic) factor shared by the monozygotic siblings.

The twin girls present a different type of diagnostic dilemma. Although AW suffered a postnatal CNS lesion, grade III intraventricular hemorrhage and developed obstructive hydrocephalus, her intellectual development was largely intact. Higher-level language processing and visuospatial weaknesses are frequently noted in individuals with shunted hydrocephalus. SW’s severe physical and mental developmental disabilities are harder to explain on purely historical grounds. However, a review of the nursery records identified a placental pathology report that found evidence of moderate to severe deciduitis and chorioamnionitis on SW’s side of the placenta. In contrast, AW’s portion of the placenta showed only minimal signs of inflammation. In a number of research studies, ascending vaginal infection resulting in chorioamnionitis has been associated with prematurity and neurological complications in both premature and term infants. Thus, the etiology for SW’s disabilities was likely a prenatally acquired CNS lesion.

Case Studies from the Child Development Center is a limited edition newsletter to help inform referring physicians and other professionals on the depth and breadth of pediatric communication and behavioral issues diagnosed and treated in the Child Development Center at Children’s Hospital of Wisconsin.

It is written by Child Development Center staff and produced by Children’s Hospital of Wisconsin in January, March, May, July, September and November.

It also is available online at www.chw.org/childdevelopment, Related Links.

Questions and suggestions can be forwarded to:

Mark Simms, MD, Child Development Center, MS 744,
Children’s Hospital of Wisconsin, PO Box 1997, Milwaukee, WI 53201-1997, or call (414) 266-2928.

©2008 Children’s Hospital and Health System. 6.5K 0108 Printery

NON-PROFIT
ORGANIZATION
U.S. POSTAGE
PAID
MILWAUKEE, WI
PERMIT NO. 2284

Children’s Hospital
of Wisconsin[®]
A member of Children’s Hospital and Health System.
Child Development Center, MS 744
PO Box 1997
Milwaukee, WI 53201-1997